# agriculture

Vol. 79 No. 4 April 1972

Published for the Ministry of Agriculture, Fisheries and Food
by Her Majesty's Stationery Office

7½p
MONTHLY

**Ministry of Agriculture, Fisheries and Food**

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(023)

# Agriculture

VOLUME 79 . NUMBER 4 . APRIL 1972

Editorial Office
Ministry of Agriculture, Fisheries and Food
Tolcarne Drive
Pinner
Middlesex HA5 2DT 01–868 7161

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*July born calves reared at pasture. Calves fed twice or once daily, or on unrestricted cold milk, were similar at twelve weeks old*

EXPERIMENTAL HUSBANDRY FARMS

**Studies at Ministry Experimental Husbandry Farms examine recent developments in the**

# Early Weaning of Calves

**S. F. Clench,** *Liscombe E.H.F.*

HOME produced beef accounts for approximately 84 per cent of total present day beef requirements. Of this some 56 per cent originates as a by-product of the National Dairy Herd, 16 per cent as cull cows and 40 per cent usually being purchased as week-old calves to be reared on milk substitute to six weeks of age. Over the last few years the cost of these calves, and the labour and food costs to rear them, have risen sharply. It has thus become essential to examine fully rearing costs and systems, and if possible to reduce both food costs and labour requirements. These possible reductions, however, must be achieved without loss of performance or increased calf mortality.

## Reducing labour demand

To reduce labour certain questions immediately spring to mind. *Can milk substitute be fed cold? Need it be fed twice daily? Why feed a liquid at all? Where does automation fit in?* Recent Experimental Husbandry Farm trials have investigated these problems.

## Is warm milk necessary?

Boxworth, Bridget's, Great House, High Mowthorpe and Trawscoed E.H.F.s have co-operated in investigating the feeding of 1 lb of milk substitute per day re-constituted in 6 pints of either warm or cold water. The warm milk substitute was fed at the usual temperature of about 38°C, and the cold milk substitute at ambient temperature. All calves received early weaning concentrate, hay and water to appetite, and weaning took place when concentrate consumption reached 2 lb per day. The overall results indicated that on an early weaning system there was no significant difference in performance between calves fed either cold or warm milk substitute. High Mowthorpe and Great House had occasional difficulty in persuading calves to accept the cold milk substitute.

## Why feed twice daily?

Experiments carried out at Bridget's, Boxworth, Gleadthorpe, High Mowthorpe, Trawscoed and Liscombe have confirmed results obtained elsewhere, namely that there is no difference in performance between calves fed once or twice daily on high (15–18 per cent) or low (4–5 per cent) fat milk substitute whether mixed in warm or cold water. At the first five farms the calves were individually penned indoors, but at Liscombe group rearing techniques both inside and at pasture were employed. The milk substitute was fed at the rate of either ¾ or 1 lb of dry powder re-constituted in 4 or 5 pints of warm (38°C) or cold tap water. In this series of trials no difficulties were encountered in persuading the calves to accept the cold milk substitute, but High Mowthorpe reported that 5 pints of a liquid mix at one feed appeared to be the upper limit which could readily be taken by smaller calves. Hereford × Friesian calves (weighing 95 lb) group reared in January/February at Liscombe, and fed cold milk once daily, were very slow to start growing and required six and a half weeks to reach a weaning weight of 135 lb. Overall liveweight gains to twelve weeks of age, however, were satisfactory. Most farms reported that once daily feeding did not adversely affect general health. Trawscoed reported that once daily feeding may render young calves more prone to 'stress' and various infections, whilst Liscombe expressed reservations about feeding cold milk once daily to very young calves during the winter months. The performance of some calves was followed through to twenty-five weeks or longer after arrival, and satisfactory liveweights were recorded for all such treatments. Once a day feeding does, however, offer less opportunity to detect quickly the calf that is 'off colour'.

## 5½ day liquid feeding or dry feeding?

Trials were conducted at Liscombe with January/February born steer calves reared indoors and July born heifer calves reared outside on pasture. These were fed liquid for 5½ days only per week from two weeks of age (i.e., no milk substitute being fed after the Saturday morning feed until Monday morning, but water, early weaning concentrate and hay were available at all times) and the result was satisfactory. No difference was detected at twelve weeks or at nine months of age between these and twice daily bucket fed calves. Dry feeding the milk substitute proved unsuitable for calves (Hereford × Friesian steers) weighing less than 120 lb on arrival at Liscombe and would seem suitable only where large calves are purchased of about 3–3½ weeks of age and where some milk powder is included in the dry concentrate feed.

*January/February born calves in August. Where the calves were followed through to 25 weeks or longer after arrival, performance was satisfactory for all treatments*

## Automation—an advantage?

Liscombe and Gleadthorpe have compared the performance and food consumption of Friesian and Hereford × Friesian steer calves fed twice daily (Liscombe) or once daily (Gleadthorpe) with calves reared on an automatic machine (Nursette). Both farms reported that peak labour demand was considerably reduced by automatic feeding. The liveweight performance to three months of age achieved was similar to that obtained by twice daily feeding and slightly better than once daily feeding. However, automatic feeding used a greater amount of milk powder (35–40 lb/calf) compared with twice daily (24 lb) or once daily (19 lb) feeding. Also, the labour saved by introducing automatic feeding machines was at the expense of a high initial capital cost. This raised the question of whether the saving of labour experienced with the automatic feeding machines could be achieved with the low capital cost of unrestricted cold milk feeding or where the supply of milk is taken from a bulk container through cheap plastic pipes and rubber teats.

At Liscombe, Friesian steer calves penned inside the calf house, or outside in an open-sided shed and reared on automatic feeding machines, were compared with similar animals penned inside and fed unrestricted cold milk from a churn. Both methods of *ad lib* feeding produced satisfactory animals, although overall performance was below normal due to a bad outbreak of virus pneumonia. Total milk powder consumption rose sharply to $\frac{1}{2}$ cwt/calf. More scouring problems were encountered on both systems of *ad lib* feeding than are normally associated with twice daily bucket feeding, the change-over period to fully unrestricted feeding is the time when scouring problems are most likely to occur. However, the calves fed cold milk performed at least as well as those reared on the automatic rearing machines, with no more labour and no machine costs, but they required a high level of stockmanship. Unrestricted cold milk feeding would seem best suited to rearing calves during the warmer months of the year.

## Reducing food cost

How does one attempt to reduce food cost? *Does one need to use high fat milk substitute? At what level of concentrate intake can expensive milk feeding be suitably terminated? Can the calf concentrate ration be simplified in make-up and cost? Is there a cheap alternative source of liquid food available?* These are some of the questions the Farms have been trying to answer.

## Optimum composition of milk substitute

Early work at Great House on Charolais calves, fed either normal or high fat milk substitute at 1 lb per 7 or 9 pints of water, showed no significant difference in liveweight gain pre- or post-weaning. High Mowthorpe and Trawscoed have compared high (15 per cent) or low (5 per cent) fat milk substitute fed twice daily at the rate of 1lb of powder mixed in 8, 6 or 4 pints of warm water. Early weaner concentrate, hay and water were offered to appetite and the calves weaned at a daily intake of the concentrated food of 2 lb/day. There were no significant differences between the treatment groups of calves during the ten or twelve weeks of the experimental period in terms of liveweight gain, total concentrate consumption and the time to weaning. At six months of age no differences were detected between treatments. Health was generally satisfactory.

## Concentrate food intake and weaning date

Experiments at Boxworth, Gleadthorpe, Bridget's and High Mowthorpe have compared the performance of calves weaned at a concentrate intake of 1 or 2 lb per day following the feeding of either warm or cold milk substitute once daily. Results at all farms have shown no significant difference in the liveweight performance to twelve weeks of age between calves weaned at a concentrate intake of 1 or 2 lb. Weaning at a concentrate intake of 1 lb per day significantly reduced the period of liquid feeding by 8–10 days, but liveweights at weaning were significantly lower. At High Mowthorpe five out of eighteen calves which were offered 5 pints of milk substitute once daily had difficulty at times in drinking this volume of liquid. Boxworth reported that calves weaned off milk after ten days, although eating 1 lb concentrate per head per day appeared to do less well than those weaned off milk at forty days. Reservations were expressed about very early weaning under commercial conditions, even when concentrate consumption was up to 1 lb/day.

## Composition of early weaning concentrates

Gleadthorpe has examined simple home-mixed early weaning concentrates fed either as coarse meal or pellets. Trials compared various rates of fish meal, soya bean meal and decorticated cotton meal in a *moist* barley mixture. The composition of the diets studied had no effect upon performance and results were similar to those obtained by feeding a more complex mixture consisting of rolled barley/oats, flaked maize, molassine meal, fish and soya bean meal. The simple mixtures fed as a coarse meal showed a slight advantage over the same mixtures fed as pellets. Initial trials at Liscombe with similar simple mixtures but based upon *dry* rolled barley met a palatability problem. This limited concentrate intake, which significantly reduced calf performance over the three-month rearing period.

## Colostrum for calf rearing

Bridget's, Great House and Boxworth are investigating the use of colostrum for extended periods of calf feeding. Twelve to thirteen gallons of colostrum are produced by the Friesian cow in the four days after calving. Is this sufficient to provide for the liquid feeding phase of the heifer calf's life? In the trials, dairy heifer calves have been fed fresh or stale colostrum from birth to weaning, colostrum for the first fourteen days of life followed by milk substitute to weaning, or colostrum and milk substitute fed alternate weeks from birth to weaning.

Calves fed continuously on colostrum from the fifth day of life were ready for weaning at a concentrate intake of 2 lb per head per day at a similar time (30 days) to those receiving high fat milk substitute or whole milk, and earlier than when fed either fresh frozen colostrum alone or in combination with milk substitute. Liveweight gains from six days to three months were also similar. The use of colostrum for the feeding period to weaning reduced calf rearing costs by £1·50 to £2·40 per animal, assuming that none of the milk that was fed would otherwise have been sold.

From these trials it would appear that untreated colostrum can be kept, even in hot weather, long enough to cover almost the whole liquid feeding period of a replacement heifer calf, merely by allowing it to sour naturally in a churn. It quickly attains a 'yoghurt-like' consistency after which it does not apparently deteriorate further and remains quite acceptable to the calves. Batches of colostrum have been kept in this way for up to eighty-five days so that expensive forms of preservation may prove unnecessary if this technique continues to prove satisfactory.

Little trouble from scouring or looseness has been observed with colostrum fed calves, even when switched abruptly to milk substitute. On one trial, however, three unexplained deaths took place on colostrum-fed treatments. Subsequently, however, a further twenty-three calves were reared under identical treatment conditions without showing any ill effects. Future investigations will be watching this position closely. Trials are continuing to evaluate optimum feeding rate, temperature and acceptable levels of storage hygiene in the hope that a satisfactory system of using colostrum, when available, for rearing dairy heifer replacements can be evolved.

## The future

Without doubt the introduction of early weaning has had a tremendous influence on calf rearing; but the quest for more information continues.

Emphasis is now turning towards problems of calf health, optimum temperature of buildings, and the control of virus pneumonia. Whatever system is adopted the skill of one of the most important members of the agricultural community must not be forgotten. The good stockman will always make the most of the calves with which he is provided. This will enable the reductions both in labour and food costs to be achieved whilst maintaining high output and a low level of mortality.

---

**S. F. Clench, N.D.A., Dip. Farm Man.,** is serving with A.D.A.S. at Liscombe Experimental Husbandry Farm, Dulverton, Somerset.

*Double row red willow hedge 16 months after planting*

EXPERIMENTAL HUSBANDRY FARMS

# Wind Protection for Soil and Crops

**Audrey M. Williams,** *Arthur Rickwood E.H.F.*

THE peaty and sandland soils of eastern England are notoriously susceptible to 'blowing', and arable farmers in these areas have had to learn how to live with this problem while trying to keep its harmful effects to the minimum.

## Causes

The factors which cause wind to be such an agricultural problem are soil particle size and density, windspeed and the growth pattern of crops.

Climatic requirements for a blow to occur are a high wind velocity in an exposed situation, combined with low rainfall and a low relative humidity of the wind itself which will dry the soil surface. Temperature in itself is of negligible importance in Britain, although frost can produce small soil particles which would be more likely to blow subsequently.

Soil structure characteristics which are important in relation to the occurrence of blows are particle size and density. Mineral soils, which are of relatively high density, are unlikely to erode unless the particle size is below 0·1 mm. Light peats, however, with a much lower density, could erode at a particle size as large as 1·3 mm in a wind of 10 m.p.h. Cultivations on peat soils which lead to surface moisture loss and frost producing fine particles are two factors which help to create these 'at risk' conditions.

The action of wind on the soil is such that soil movement is of three kinds. The larger, denser, particles creep along the soil surface, smaller lighter particles bounce and jump just above the soil surface and 'bombard' other particles, and the smallest, lightest particles form the spectacular but in fact less damaging dust cloud.

It is well known that erosion often starts in limited parts of a field with a spread outwards, as happened for instance in 1968 at Arthur Rickwood E.H.F. when foci of erosion were associated with slight depressions in the soil level.

## Effects

There are four known harmful effects of wind on crops and the farming system.

1. The actual removal of surface soil and its deposition either in neighbouring fields or in dykes and ditches. At the most vulnerable season of the year, between March and May, this means the removal of seeds and seedlings, fertilizer and herbicide. Thereafter come the problems of additional cultivations, redrilling and the often difficult husbandry decisions regarding further herbicide application to the redrilled crop.
2. Crop losses, or at least the failure to establish the crop satisfactorily. Sand or soil blasting of the aerial part of the plant can be very harmful. On 21st May 1970 at Arthur Rickwood all above ground parts of an onion crop at the 2-true leaf stage were removed by a 'blow'. The plant did recover sufficiently to produce a reasonable crop, but yields were much reduced.
3. Wind rocking of plants, leading to cracking and twisting of stems. Under these conditions plants may break off or fail to recover.
4. In prolonged high velocity winds, transpiration losses can be harmful, resulting in a failure of the plant to 'thrive'. Here there will certainly be yield reductions, and sometimes a delay in maturity which would play havoc with programmed marketing.

## 'At risk' situations

It is said that widespread 'blows' in the Fen area occur once in 3 to 5 years. Localized 'blows', however, can be more frequent, and at Arthur Rickwood four damaging blows occurred during the three seasons 1968–70.

Records from 1935–53 in the Fens show that 65 per cent of winds associated with soil blows came from the west and south west aspects, 23 per cent from the north and east, and 12 per cent from the north and west. The period when strongest winds persist in East Anglia is during April and May, but damaging winds, if not actual 'blows' (20 knots), have been recorded at Arthur Rickwood from 15th March until as late as 4th June. Crops can be considered to be 'at risk' until they have sufficient foliage to be self-protecting. For bulb onions and celery grown from seed this is a lengthy period from early spring to mid-summer. Early drilled carrots and lettuce are at risk during March to early July, and even sugar beet and red beet can suffer damage up to late May or early June.

## Protective methods

Several methods have been used to avoid or diminish the worst effects of wind erosion. These methods include minimal seedbed cultivations to produce a knubby finish rather than the more traditional fine tilth usually demanded by growers of small seeded vegetable crops such as onions. Experience at the E.H.F. has shown that late ploughing, followed by one pass of a reciprocating harrow and fen press may be sufficient, leaving the press wheel of a precision drill to give the final seedbed finish.

Other approaches, designed to reduce the effects of wind both on soil and crops, include the use of temporary artificial shelter, the planting of permanent living shelter, inter-row 'nurse' crops of barley or mustard and the application of soil stabilizing materials to soils particularly at risk. All of these except the use of artificial forms of shelter have been studied at Arthur Rickwood.

## Permanent living shelter

Some reduction of wind speed is provided by a hedge for a distance of 30 times its height (H) down wind and 5 $\times$ H to the windward side. For a reduction of wind speed of 20 per cent or more the downwind sheltered zone would be only 20 $\times$ H.

Soils may vary in their susceptibility to blowing, and at Arthur Rickwood the high risk soils are those of a loamy peat topsoil of depths varying from 12 to 36 in. overlying a compacted fine sand and gravel subsoil. Less susceptible are the remaining areas of the farm which are mainly loamy peats overlying a fen clay subsoil.

The cropping pattern there is typical of many local fen farms with about 50 per cent of the acreage under cereals, 17 per cent potatoes, 18 per cent sugar beet and 15 per cent vegetable crops such as carrots, onions and celery. Of these crops, cereals could be said to be 'indifferent' to shelter. With potatoes there might be a slight disadvantage due to increased localized humidity; this could increase blight. Sugar beet may well benefit from shelter, especially in the establishment phase of the crop, but later on there might be a build-up of aphis and spraying frequency might need to be increased. The vegetable crops, however, would undoubtedly benefit from shelter, and one would expect to see extra revenue from such sheltered crops.

The desirability of providing some form of living shelter at the farm became more obvious when it was realized that experiments which were costly of labour and resources were being 'sabotaged' by the effects of wind. In addition to the loss of experimental data and crop revenue, it was estimated that for an 'average' onion or carrot experiment it would cost approximately £130 to the point of establishing the trial, and this sum is therefore at risk in addition to the other losses. Other advantages deriving from the provision of shelter could be summarized as follows:

(*a*) improved growth and crop yields;

(*b*) value to the E.H.F. and A.D.A.S. for demonstrating the effects of shelter;

(*c*) saving in the cost of removing blown soil from dykes;

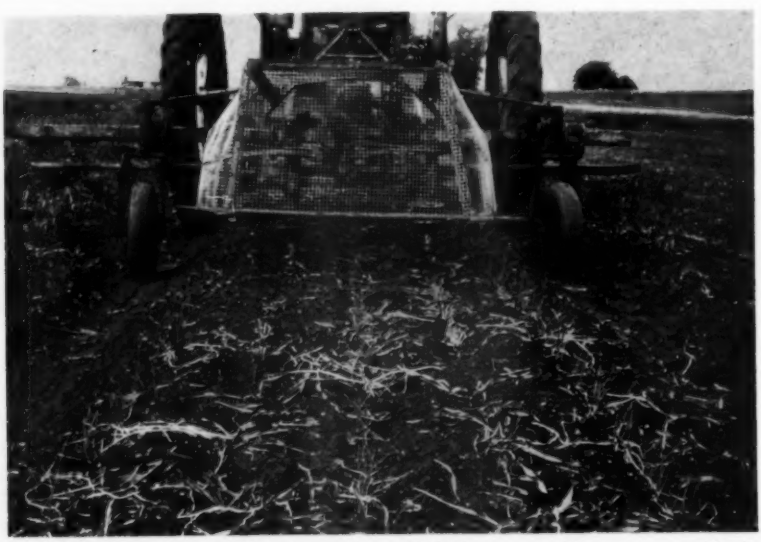
(*d*) improvement in conditions for farm labour working in a sheltered environment;

(*e*) basis for good public relations, because of public awareness of the prevention of 'blows' in the area and of providing an improved aesthetic effect; and

(*f*) possible assistance in the reduction of eelworm spread following 'blows'.

Some disadvantages of providing living shelter can be envisaged, mainly in relation to the loss of land which the shelter occupies and the cost of planting and maintenance. Shelter could provide a better habitat for small mammals and birds and could lead to a build up of mildew, blight, etc., with some extra difficulty in spraying access. From the experimenter's point of view trials would have to be carefully sited in such a way that all plots received the same degree of shelter.

A consideration of these 'pros' and 'cons' resulted in the decision in March 1970 to plant red willow hedges in staggered double rows 3 ft apart and at 3 ft between plants in the row on the west and south west aspects of that part of the farm containing a sandy gravel subsoil. The planting method was to take out an 18 in. deep slit with a mole drainer, into which the unrooted willow slips were pushed by hand. The planted row was firmed in by one pass with the tractor, with the wheel set as close in as possible to the line of slips without damaging them. After rooting and starting into growth, the slips were pruned hard back to encourage lateral growth from the base. In the early spring of 1971, various methods of pruning were tried to compare subsequent shape and growth. These willows should make rapid growth and achieve a height of 10 ft in five years. The objective will be to maintain them at a height of 15–20 ft to provide a sheltered zone of approximately 300–400 ft on the lee side. This is a low cost system of establishing shelter hedges; planting costs were £2 per sheltered acre, and annual maintenance costs of the same order.



*The 'Inter-ro-mo' developed at Arthur Rickwood E.H.F. mowing off a nurse crop of barley between onions on 20 in. rows*

## Short term shelter

Inter-row nurse crops of barley or mustard have been tested at Arthur Rickwood between drilled crops of sugar beet and onions. The trials were an attempt to determine the optimum stage of destruction of the nurse crops so that they provided the necessary shelter without reducing crop yield. Chemical and mechanical methods of destruction were also compared.

In individual trials, onions and sugar beet on 20 in. rows were interplanted on 1st April with double rows of either mustard or barley. Destruction treatments using either paraquat or rotovation equipment were carried out on 20th May, 28th May and 9th June.

At the earliest stage there were no difficulties in destroying the nurse crop, but growth, particularly of the mustard, soon became very rapid and late destruction was physically difficult and reduced crop yields. Problems with chemical 'splash-back' occurred on sugar beet, and 'late' destruction was more satisfactory with rotovation than with chemicals. Barley, with its less vigorous habit, was easier to manage than mustard, but by the methods adopted useful protection was limited to about four weeks. The onion crop really needs protection for three months or more and the methods described above were obviously not meeting this requirement.

*Chemical destruction of inter-row mustard on experimental plots*

It was therefore decided in 1971 to continue with the inter-row barley, but to contain it by mowing at intervals until such time as the onions had become self-protecting and the barley could be destroyed altogether. The mowing was done with a machine developed for the purpose and which we call the 'Inter-ro-mo', developed from a double-headed sugar beet thinner. The important modifications were the turning of the thinner heads through 90°, replacing the thinner fingers with two rotary cutter blades, and then increasing the tip speed to 5,400 feet per minute to achieve adequate cutting action.

The growth rate of barley (variety Clermont) was about 1 in. per day, and we considered it desirable to mow when it reached 10 in. in height. A planned programme of mowing alternate strips every five days enabled a satisfactory shelter situation which was effective for eleven of the fourteen weeks during which the onions were in a vulnerable stage.

The work rate of the Inter-ro-mo is one mown acre or two acres of alternate strips per hour, and the additional costs for the system were estimated to be £4·44 per acre per season, inclusive of barley seed and all mowing costs.

*Simulated 'blow' tests on strips of land treated with soil stabilizing materials*

## Soil stabilizers

From time to time the plastics industry produce materials which are tested as soil surface stabilizers. This approach to the problem of wind erosion of soils depends for its success on several factors. A material is required which will bind the soil surface against movement by high velocity winds, which will cost not more than £10 per acre, and which can be applied at a volume rate not exceeding 100 gallons per acre. Ideally it should not need to be applied to moist soil, and it should have an effective life of 6–10 weeks.

In trials during 1971 four co-polymerised plastic emulsions and an organic stabilizing material were tried at various dilutions and application rates. Some of the materials were impractical as they left spraying equipment in an unpleasant state and difficult to clean, and some were only effective at rates which would be uneconomic. Their effectiveness as soil stabilizers was tested by using an engine-driven fan to provide simulated 'blows'; anemometers at ground level indicated air speeds at which the soil particles began to move, and the point at which soil began to creep. The most promising plastic material allowed air speeds 10 m.p.h. greater than on the unsprayed area before soil movement occurred. The dilute material was applied at 50 gallons

per acre and the cost was within the target of £10 per acre.

Several approaches to the agricultural problems caused by wind have been described in this article. Clearly it is the farmer who recognizes the circumstances in which he can bring any or all of these methods into use who will be likely to succeed in reducing the harmful effect of wind on his farming system.

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**Audrey M. Williams, Dip. Hort.,** is the Deputy Director of the Arthur Rickwood Experimental Husbandry Farm at Mepal, near Ely in Cambridgeshire.

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## Soil Survey Records

The Soil Survey of England and Wales has announced details of its new mapping programme. Detailed soil surveys are being made of selected 1 : 25,000 Ordnance Survey maps in each county of England and Wales. Maps are selected for areas of geomorphological and agricultural importance. They will be published in an outline edition and will form the basis for County and Regional Maps.

A new series of publications, known as Soil Survey Records, will accompany the maps. Each Record includes introductory chapters on the physical environment and on soil formation and classification, followed by detailed studies of the soils mapped, grouped, when possible, into landscape units. Finally, soils are related to agriculture, horticulture and forestry, emphasis being placed on land use capability. Landscape models show how the soils are related to land form.

The following Soil Survey Maps and Records are now available *

(*b*) Soils in Norfolk I: Sheet TM 49 (Beccles North)
Soils in Herefordshire I: Sheet SO 53 (Hereford South)

(*a*) Soils in Derbyshire I: Sheet SK 17 (Tideswell)
Soils in Cheshire I: Sheet SJ 65 (Crewe West)
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Soils in Yorkshire I: Sheet SE 65 (York East)

(*b*) Soils in Essex I: Sheet TQ 59 (Harold Hill)
Soils in Nottinghamshire I: Sheet SK 66 (Ollerton)

(*a*) Soils in Devon I: Sheet ST 10 (Honiton)

(*a*) Land use capability map available. (*b*) Land use capability and drainage maps available.

*Price 25p each for Maps and 50p. each for Records, from The Soil Survey, Rothamsted Experimental Station, Harpenden, Herts.

Maps for educational and teaching purposes may be obtained from The Ordnance Survey, Romsey Road, Maybush, Southampton, SO9 7BR.

# Farm Rents in England and Wales

## 1971 compared with 1970

An enquiry in October 1971 by the Lands Arm of the Agricultural Development and Advisory Service took in 27,000 tenanted holdings of which 6,500 showed a rent change. This covered nearly 3¾ million acres or about 30 per cent of the total tenanted acreage of crops, grass and rough grazing in England and Wales, and showed that rents rose between 1970 and 1971 by 4·7 per cent on average, from £5·56 per acre to £5·82 per acre. This percentage increase is appreciably less than in previous years. The 1970 enquiry showed an increase of 6·5 per cent while in each of the preceding seven years the increase had been close to 7 per cent.

Within these broad national figures there were considerable fluctuations both regionally and by farm size. The percentage increase for Wales at 5·8 per cent was somewhat higher than England, rents rising from £3·26 per acre to £3·45. As the map shows, the eastern side of England has the highest rental values with the high quality land in Cambridgeshire and Lincolnshire commanding rents of around £10 per acre. In the hill and upland areas of England and Wales, however, rents as low as 50p per acre were recorded, with an average of around £3.

Table 1 shows the average rent per acre for each size group by region. In all regions the small farms of up to 15 acres have the highest rents per acre, reflecting the relatively high investment per acre in buildings and the dwelling house. In Wales and in the northern and upland regions of England rents per acre generally decrease as the size of farm increases. In the Eastern and East Midland regions the rents per acre are higher for the large farms with over 500 acres than for those in the intermediate categories (50–500 acres), probably reflecting the benefits of larger scale operations.

Nearly a quarter of all the farms in the enquiry had a rent change between October 1970 and October 1971 (Table 2). On farms where a change in rent occurred there was an increase from £5·47 per acre on average to £6·39 per acre; this represented an increase of 17 per cent, which was less than in previous years. These new rents varied from an average of £14 per acre in some counties to an average of 40p in others. The most common type of change was by agreement between landlords and sitting tenants, and these showed an increase of only 14 per cent over the October 1970 levels. As in previous years there were very few instances of farms let by tender or of rents settled by arbitration. The percentage changes recorded in these two categories have varied considerably between successive enquiries.

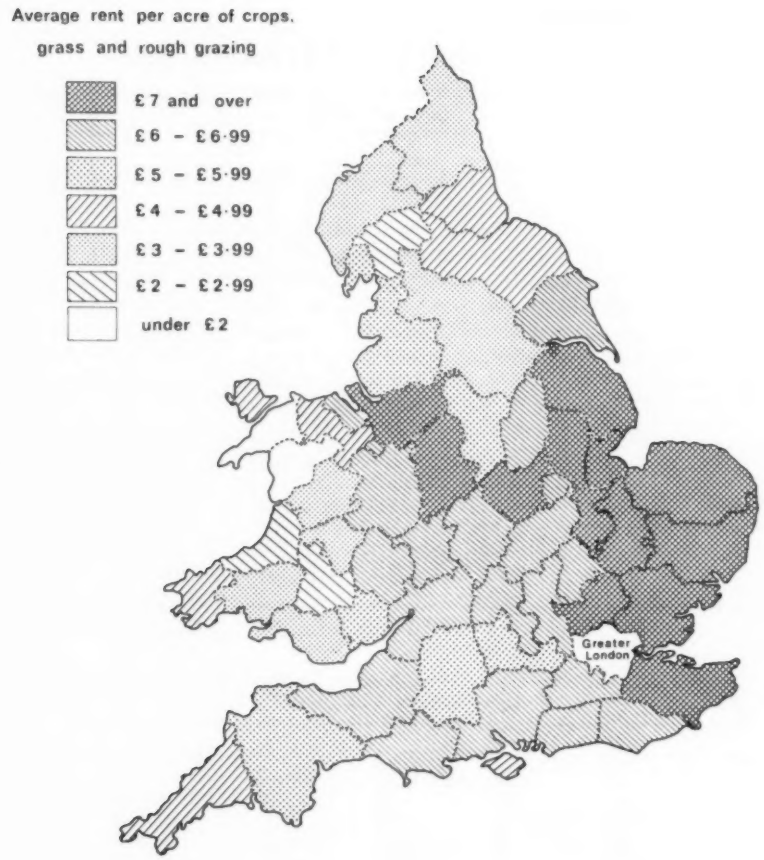
Table 3 shows the average rents and average new rents by region. Generally the rent increases in 1971 were least in the arable areas of the East and South East Regions, probably reflecting the difficult cereal growing and harvesting conditions of the late 1960s. The largest increases occurred in dairying and livestock areas in Wales and the North of England.

**Table 1. Average rent in £s per acre by acreage size groups within regions of England and Wales, October 1971***

| M.A.F.F. Region | acreage size groups | | | | | | | | | | Average for all sizes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0–14 | 15–29 | 30–49 | 50–99 | 100–149 | 150–299 | 300–499 | 500–699 | 700–999 | 1000+ | |
| Eastern | 9·26 | 7·94 | 8·55 | 7·78 | 7·57 | 7·21 | 7·74 | 7·97 | 7·76 | 8·97 | 7·96 |
| South Eastern | 14·07 | 6·88 | 6·50 | 6·12 | 5·86 | 6·33 | 6·88 | 6·99 | 6·76 | 5·29 | 6·47 |
| East Midlands | 7·61 | 5·90 | 6·77 | 6·65 | 6·41 | 6·44 | 6·87 | 7·37 | 7·54 | 8·04 | 7·00 |
| West Midlands | 12·84 | 7·95 | 7·47 | 7·22 | 6·97 | 6·90 | 6·73 | 6·12 | 7·42 | 2·30 | 6·93 |
| South Western | 10·28 | 6·01 | 6·25 | 6·14 | 5·44 | 5·67 | 6·02 | 6·51 | 6·32 | 5·68 | 5·93 |
| Northern | 8·34 | 5·91 | 4·77 | 4·75 | 4·83 | 4·71 | 4·68 | 4·59 | 2·11 | 1·00 | 3·67 |
| Yorks. and Lancs. | 15·57 | 5·96 | 5·81 | 5·94 | 5·28 | 5·22 | 5·54 | 4·12 | 2·80 | 2·59 | 5·01 |
| England | 11·28 | 6·79 | 6·74 | 6·39 | 5·92 | 5·97 | 6·36 | 6·54 | 6·01 | 4·98 | 6·09 |
| Wales | 7·83 | 5·15 | 4·52 | 4·14 | 3·62 | 3·66 | 3·29 | 2·08 | 1·27 | 0·44 | 3·53 |
| England and Wales | 10·68 | 6·49 | 6·35 | 6·01 | 5·57 | 5·71 | 6·13 | 6·34 | 5·78 | 4·71 | 5·82 |

*Survey rents have been weighted by the total tenanted acreage in each county at the June 1971 Census.

## Average County Rent Levels, 1971.




### Note on the 1971 Survey

The 1971 enquiry collected, for the first time, details of the rent paid for each individual farm, instead of the overall total for an estate, with separate details only for those farms on which there had been a rent change. This enabled analysis of rents by farm size to be carried out.

### Previous enquiries

Enquiries into rents received by agricultural estates in England and Wales have been carried out by the Agricultural Land Service (now the Lands Arm of the Agricultural Development and Advisory Service) each October since

1961, and articles have appeared regularly in *Agriculture* each spring giving the main results of the previous October.

Agricultural Land Service Technical Reports Nos. 19, 19/1 and 19/2 *Farm Rents* give full details of the 1968, 1969 and 1970 surveys, together with a summary of information from earlier years. A report covering the 1971 enquiry is in preparation.

**Table 2**

**Average rent in £s per acre of crops, grass and rough grazing in England and Wales by type of rent change**

| Type of Rent change | Percentage of farms in the enquiry | Percentage of total acreage in the enquiry | Rent per acre of crops, grass and rough grazing October | | Per cent change between 1970 and 1971 |
|---|---|---|---|---|---|
| | | | 1970 | 1971 | |
| | | | £ | £ | |
| New tenancy | | | | | |
| by tender | 0·2 | 0·5 | 3·81 | 5·64 | + 48 |
| by agreement | 2·3 | 2·4 | 5·15 | 6·77 | + 31 |
| Sitting tenant | | | | | |
| by agreement | 21·5 | 25·6 | 5·67 | 6·45 | + 14 |
| by arbitration | below 0·05 | 0·1 | 1·77 | 2·20 | + 24 |
| Total with a change | 24·0 | 28·6 | 5·47 | 6·39 | + 17 |
| Total with no change | 76·0 | 71·4 | 5·59 | 5·59 | — |
| Total all farms | 100·0 | 100·0 | 5·56 | 5·82 | + 4·67 |

**Table 3**

**Average rent per acre in October 1971 in England and Wales on all farms and on those with a rent change from October 1970**

| M.A.F.F. Region | All rents | New rents | |
|---|---|---|---|
| | Average rent £ | Average rent £ | Percentage increase in rent over previous year for the same farms |
| Eastern | 7·96 | 8·62 | 10·37 |
| South Eastern | 6·47 | 6·96 | 15·23 |
| East Midlands | 7·00 | 7·47 | 18·00 |
| West Midlands | 6·93 | 7·61 | 18·90 |
| South Western | 5·93 | 6·50 | 14·84 |
| Northern | 3·67 | 4·12 | 19·76 |
| Yorks. and Lancs. | 5·01 | 5·32 | 20·63 |
| England | 6·09 | 6·59 | 16·22 |
| Wales | 3·53 | 4·53 | 27·24 |
| England and Wales | 5·82 | 6·39 | 16·81 |

**Changing dairying techniques of Northants indicate developments in**

# A Decade of Dairy Husbandry

G. Sinclair

DURING 1960-70, whilst the number of dairy farms in Northamptonshire fell by almost 50 per cent, the cow population remained fairly constant, so that the average herd size practically doubled from twenty-three to forty-four.

This increase, three times that in the previous twenty years, was brought about by economic pressures which caused many small farms to leave the industry and resulted in a dramatic rise in the number of herds of 50–100 cows. This group alone increased by 150 per cent, (Fig. 1) between 1966 and 1970.

Vast changes had to be made in many aspects of dairy husbandry so that farmers could cope with greater numbers of cows, with the same or a reduced

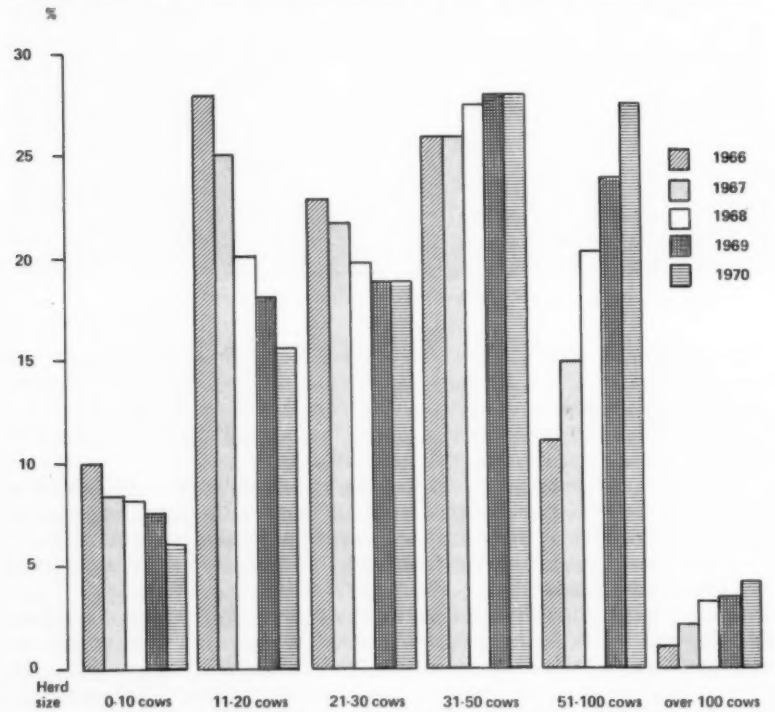
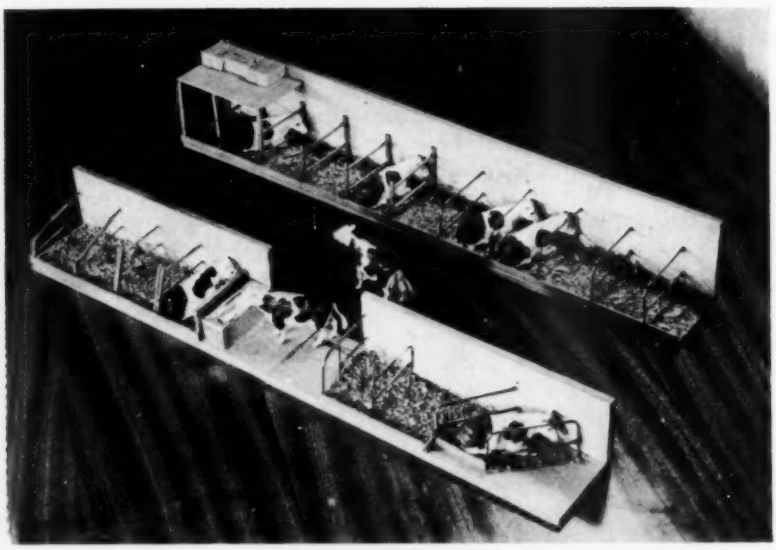



FIG. 1. Proportion of herds in various herd size groups, 1966–70

labour force so as to lower production costs and increase milk sales per cow. In the main these were concerned with dairy buildings, both for housing and milking cows, and with systems of milking and milk handling. Also, local farmers took advantage of other important advances in dairying which had been taking place, particularly those relating to dairy hygiene, cow management and mastitis control.

## Yard and parlour system

The yard and parlour system formed the basis of most herd expansion programmes because of the reduced labour requirement and greater flexibility of loose housing and parlour milking. In some cases the change was less complete and, whilst loose housing was provided for the cows, the cowshed remained in use as a milking parlour.



*Models of some of the many cow cubicles which have appeared*

The combined effect of these trends was that whilst several hundred cowyards were erected in the county during the 1960s, only one new cowshed was built. Consequently, whereas in 1960 cows had been housed predominantly in cowsheds, by 1970 the situation had reversed, and almost 75 per cent of all herds were loose housed.

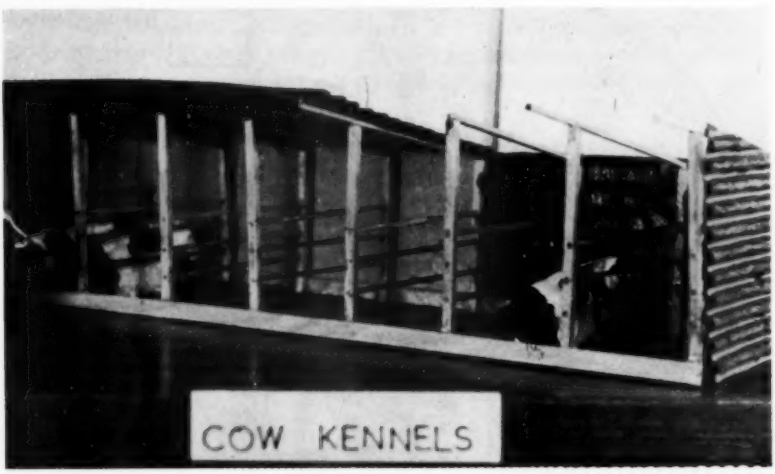
Before 1968, loose housing consisted almost entirely of strawed yards but for various reasons, there was then a marked and continuing move towards the cow cubicle system. This was encouraged by the emergence of methods of slurry handling and disposal suitable for most farm situations, thus reducing this hitherto major disadvantage of the cubicle system.

As herd sizes continued to rise, the cost and physical problems of handling the quantities of straw required for strawed yards, even in areas such as Northamptonshire where straw was in plentiful supply, became excessive. This usually amounted to 90 bales per cow per winter (half a bale per day); by contrast, the cubicle system, using straw as the bedding material, requires

10–12 bales per cow per winter and gives improved cow cleanliness.

The cost of installing a cubicle system was reduced by 1968 by the many variations of the original Howell Evans design which could be constructed cheaply by farm labour. Buildings otherwise unsuitable for housing cows could be used for both proprietary and home-made cubicles at little cost. One example, typical of this type of economy, was the successful conversion of a disused poultry house, 60 × 18ft, to house twenty-six cows; two rows of herringbone cubicles complete with central passage were installed for only £80.

Finally, complete low-cost housing systems had made their appearance. These were in the form of cow kennels and purpose-built cubicle houses, both of which could usually be erected for a lower cost than the general purpose type building into which cubicles would have to be fitted.




*Model of low-cost kennel housing for cows*

## Parlour types

In most cases prior to 1967 the parlour was the two-level abreast type, although the number of herringbone parlours had been steadily increasing.

The 6-stall 3 point abreast parlour was most useful for herds of 50–60 cows because one man could complete milking in about two hours. Since installation of this type was often the first step on from cowshed milking, its erection in a part of the existing cowshed was a simple and cheap way to progress to parlour milking. The cost could often be further reduced by using second-hand abreast parlour fittings and milking plant available, in part from farms going out of milk production but more often as a result of herds expanding from the 50–60 cow to the 60–100 cow level, thus necessitating a change from an abreast to a herringbone parlour. The latter type, involving batch milking of cows and the use of more milking units per operator, enables 60–100 cows to be milked in the same time as 50–60 in the abreast parlour, but with less effort.

In the early 1960s the design of the feeding arrangements in herringbone

parlours was not very satisfactory and the positioning of the stall and manger fittings made them unsuitable for British breeds. During 1963 these aspects were studied in detail by Dairy Specialists of N.A.A.S., whose recommendations made the herringbone parlour increasingly acceptable as a means of milking cows. From 1967 that type was usually preferred. However, such had been the earlier popularity of the abreast type that even in 1970 the number in use was still double that of the herringbone (Fig.2).

Many herringbone parlours built from 1968 onwards had low level pipelines beneath the cowstandings on both sides of the operator's pit, with one milking unit per cow stall. This was aimed at improving vacuum stability at the machine cluster, the milking out rate and cow throughput in comparison with the conventional herringbone, thus making a formidable rival to the first rotary tandem parlours being planned locally in 1970.

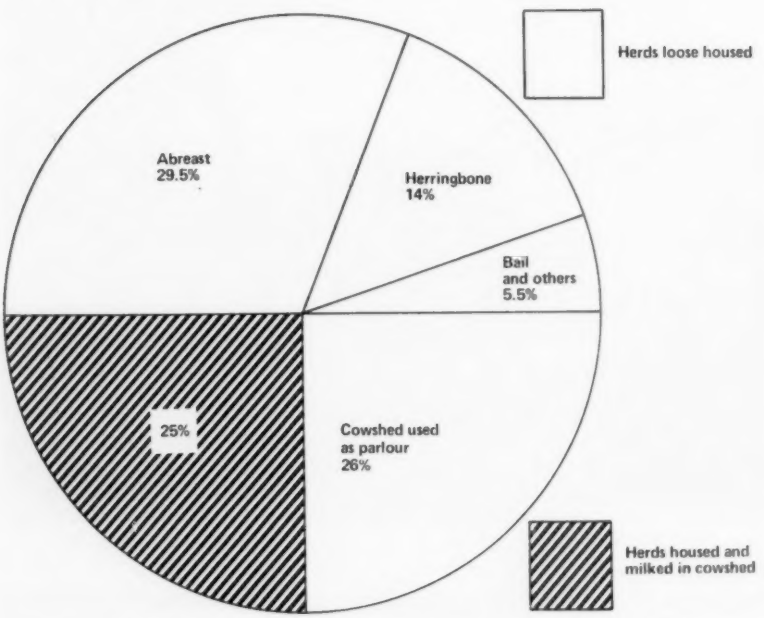



FIG. 2. Distribution of types of milking premises and cow housing, 1970

## Milking and milk handling

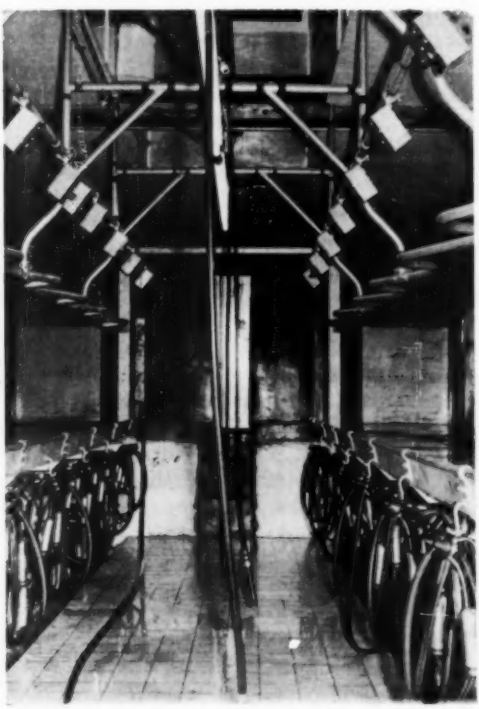
Just as the yard and parlour system removed much drudgery from the everyday work of the herdsman, so the installation of milk pipelines and bulk milk tanks eliminated the effort of carrying and cooling milk and handling milk churns.

In Northamptonshire, in 1960, the number of milk pipelines was small and they increased in popularity only as cleaning and sterilization and installation became more efficient. Improvement in cleaning and sterilization was made possible by the use of better construction materials, in particular heat resistant glass, synthetic rubber and stainless steel, and also by design simplification, leaving fewer areas to serve as breeding grounds for bacteria.

Cleaning these systems was primarily by recirculation of a hot water solution of an approved detergent-sterilizer. Since the efficiency of this method was found to depend largely on the maintenance of a high temperature of the solution, an alternative method, Acidified Boiling Water Cleaning, was developed at the National Institute for Research in Dairying. The first commercial milking plant using this system was installed in Northamptonshire in February 1965, and the method soon became widespread.

There was also a much more general improvement in the standards of installation involving all types of milking systems. This was largely the result of a survey, the first to focus attention on this neglected aspect of milking machines, carried out by the N.A.A.S. in 1960, which revealed that some 90 per cent of installations were mechanically faulty. Because of this, in 1966 a National Milking Machine Testing Service was introduced by the Milk Marketing Board. This not only enabled farmers to have their plant regularly tested at little cost, but also helped set a good standard for new installations by revealing deficiences in existing plants.

The most important development came in 1968 with the publication of a *British Standards Code of Practice for Milking Installations*, which brought about a higher standard in the design, installation, testing and maintenance of new milking plants.



*A herringbone parlour with low level pipeline and one milking unit per cowstall*

It was to be expected that pipeline milking would become popular as there were now two generally reliable cleaning methods of pipeline systems available and the standard on installation continued to improve. It was not

anticipated, however, that by 1970 two out of every three herds in the county would be milking into some form of milk pipeline system. The existence of so large a proportion of farms using pipelines thus greatly facilitated the spread of bulk milk collection; in some cases both were introduced simultaneously. The first bulk milk collection scheme in Northamptonshire started in May 1964. In the following six and a half years, bulk tanks were installed on 40 per cent of the dairy farms, and the volume of milk collected by road tanker then reached almost 70 per cent of total farm milk sales.

The high rate of herd expansion occuring during this period was revealed by the fact that on many farms the original bulk milk tank was then found to be inadequate and an additional or a larger tank had to be installed.

## Cow management

There was a danger that with rapid herd expansion, modernization and increased mechanization on dairy farms, with the emphasis being on 'more cows per man' and 'more cows per man hour', all in the interests of economy, the cow, the most important consideration of all, could become a mere cipher, and attention to detail, so essential to good management, neglected. Many farmers were quick to foresee this danger. They adopted such management aids as had been devised; for example, cow identification and breeding charts, to help offset these possibilities. There were many non-permanent markers in use to identify individual cows, the most popular being numbered tail tape and neck collars. By 1970, however, freeze branding, one of two permanent ways of marking cows, had emerged as the most useful method of cow identification for field, cowyard and most types of milking parlours.

Breeding charts, designed for use where cows could be identified by name or number, were invaluable to stockmen. They give a clear indication of the breeding status of the herd on any one day, enabling a stockman to highlight any cow which returned to service and, if necessary, to obtain veterinary attention earlier than might otherwise be possible. This helped maintain a good calving index for the herd.

## Mastitis control

One development in dairy husbandry for which the 1960s will undoubtedly be remembered was the establishment of a practical mastitis control system* by the N.I.R.D. and the Ministry's Central Veterinary Laboratory. This revealed the value of a post-milking teat dip to prevent new udder infections and of treating the cows at drying off with a slow-release antibiotic to eliminate existing udder infections. In a field experiment in thirty commercial herds carried out over two years, these methods used in combination had been shown to reduce the levels of infection from 55 to 22 per cent of cows, and 28 to 9 per cent of quarters, and clinical mastitis by some 40 per cent. So it was not surprising that this control system was being used by a growing number of the county's dairy farmers in the late 1960s.

On local farms the preferred teat dip in use was an iodophor (0·5 per cent available iodine), but in herds where teat chaps were a problem an iodophor/glycerol dip could be used instead. By 1970, however, interest was being shown in chlorine teat dips, either the commercial dips containing 4 per cent available chlorine or a hypochlorite teat dip (1 per cent available chlorine)

*Referred to in article 'Mastitis Control' by C. D. Wilson, *Agriculture*, May 1971.

which could be produced more cheaply on the farm by diluting one part of Approved Dairy Hypochlorite with nine parts of water.

Throughout the 1960s many farmers, veterinary surgeons and advisers felt that the milking machine was a major factor influencing mastitis levels within herds, either because of its physical properties or its method of use. There were many reports of mastitis outbreaks associated with faulty equipment, but direct evidence of a relationship between machine milking and mastitis was limited. In 1967, however, Irish workers demonstrated that unstable vacuum conditions were associated with an increase in new udder infection. Although they described different causes of vacuum fluctuations, the precise manner in which these influenced the establishment of new infection remained uncertain. Until further research adds to our understanding of such milking machine factors as may influence mastitis levels, these experiments can only emphasize the importance of good installation and maintenance of existing plants.

## Conclusions

In retrospect, the nature and extent of the changes which occurred in dairy husbandry throughout the 1960s constituted nothing less than a technological revolution, to which all sides of the industry contributed. The Farm Improvement Scheme and agricultural investment grants on fixed equipment, by reducing the capital cost to the farmer of dairy buildings and equipment, played a major role.

It would appear safe to predict that the trend towards fewer dairy farms and larger herd size seen throughout these last years is not likely to alter in the near future; and also that new dairy units will, in the main, comprise herringbone parlour milking and cow cubicle housing. For very large herds, however, rotary type parlours, incorporating greater automation of operation, could become the installation of choice.

The steady replacement of the milk churn by refrigerated bulk milk tanks inevitably will continue, and as farms and dairies handling churns are becoming fewer and more widely scattered, the problem will be the increasing cost of churn collection.

Finally, with a continuing emphasis on milk output, there is every indication that the level of management of the individual cow will be no less important in the 1970s than it has proved to be in the previous decade.

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### N.I.R.D. Open Days in June

The National Institute for Research in Dairying will be holding Open Days at Shinfield on Wednesday 28th and Thursday 29th June 1972. Demonstrations in the laboratories and on the farms will illustrate the scope of the Institute's research.

Anyone who is interested is invited to the Open Days and further details may be obtained from The Information Officer, N.I.R.D., Shinfield, Reading RG2 9AT.

**Role of the National Fruit Trials in meeting the changing needs of**

# The Fruit Growing Industry

**J. M. S. Potter,** *National Fruit Trials, Brogdale*

WHEN the National Fruit Trials started in 1922 the primary object was to test new and little known varieties of all kinds of hardy fruits to determine their commercial merit. The suitability of many new varieties then being planted commercially was unknown, and it was not uncommon to find a grower with as many as forty varieties of apples, many of little commercial value.

However, conditions have changed. There has been a considerable reduction in the number of apples grown commercially as many older varieties did not meet present-day requirements and some others may also soon disappear. Some unsatisfactory apples such as Beauty of Bath, Stark Earliest (sometimes called Scarlet Pimpernel) tend only to glut the early market with fruit of poor quality. It could also be said that there are still too many Worcester Pearmains being grown and that Lord Lambourne and Ellison's Orange hardly come up to present-day standards.

Conversely, however, an examination of the acreage of apples shows that there has been a rapid increase in Cox's Orange Pippin, and while this may be regarded as the finest of all dessert apples, it is dangerous for the industry to depend largely upon one variety. Cox's Orange Pippin, Worcester Pearmain and Bramley's Seedling, all well over 100 years old, occupy a greater acreage than all other varieties together. But with the industry dependent upon varieties of some antiquity, growers are becoming anxious for the introduction of apples and other fruits which are distinct improvements on existing ones.

## Start of trials

Before the trials began it was largely growers themselves who, by trial and error, sorted out the varieties with commercial potential from those of little merit. An example is the apple Laxton's Fortune which was widely publicized, but not by the National Fruit Trials; although of excellent flavour it has fallen short on cropping, colour and other characters. On the other hand, the pear Doyenné du Comice was introduced commercially on a very small scale; with experience it was found to have commercial merit, and its acreage has therefore increased making it second only to Conference. Comice is now one of the standards used for comparison with new varieties.

When the trials began, most material came from amateurs or nurserymen, and it is interesting to note that the fruit-growing industry, particularly the apple section, owes more to the amateur than to the professional breeder.

Cox's Orange Pippin and Bramley's Seedling were raised by amateurs, while Golden Delicious, probably the most universally grown apple, and the pear Williams's Bon Chrétien, sometimes called Bartlett, were chance seedlings. Conference was bred by the firm of Thomas Rivers. Until recently little effort was made to improve variety, most research being concentrated on rootstocks, pruning, manuring, spraying, etc. However, this has completely changed. The introduction of new varieties by amateurs and nurserymen has practically ceased, replaced by scientific breeding at research stations here and abroad with specific objectives in view.

## Fruit characteristics

The testing of varieties for commercial purposes has become highly technical and can be undertaken only by the expert. A new apple must have certain qualities to make it acceptable:

*yield*—must be high yielding (well in excess of any variety it is likely to replace); and regular (heavy cropping in alternate years causes irrational and uneconomical marketing);

*fruit*—size must be large and in the right range, of attractive appearance, and must store with little wastage and have a good shelf life; above all *flavour* must be good;

*health*—both tree and fruit must not be unduly susceptible to pests and diseases.

Enlarging on some of these factors, the young trees must come into bearing at an early age with the flowers setting easily so that the crop is adequate and not unduly affected by seasonal conditions. On yield, Cox's Orange Pippin will produce about 500 bushels per acre (bushel is approximately 40 lb), but by modern standards this is too small a crop and the aim must be for varieties which, like Crispin, yield 1,000 bushels per acre without exhausting the tree or producing small fruit. Golden Delicious in France and other warmer countries will give 1,000 bushels and more, and this is the kind of competition which must be met.

The next important factor is size. Before the last war apples of 2–2½ in. diameter were acceptable, but now the demand is for larger and larger fruits, the optimum size at present being 2½–2¾ in., compatible with the metric standard of 65–70 mm. This new size seriously affects some of our varieties such as Cox's Orange Pippin, 50–60 per cent of the fruit of which can fall below 65 mm. So new varieties must produce more large fruit, as already do Crispin and Holstein.

The appearance of the fruit should be bright, attractive and look alive. It is preferable for the apple, for example, to be bright red or clear green or golden yellow; dull colours tend to experience sales resistance, even though eating quality is good. General texture must be such that the fruit will travel without readily bruising and still look very much alive when sold. On the whole the public does not like dry fruits; although an apple may sell on appearance alone, if it is not juicy and of good flavour the public will tend eventually to reject the variety. It is sometimes said, wrongly, that old apple varieties have better flavour than modern ones; the best that breeders now produce are as good as those of the past.

Nowadays, to ensure orderly marketing it is important to look for varieties which will store well and long and will not succumb to disease and disorders in store. Although controlled atmosphere storage is used to extend the marketing life of a number of varieties of apples and pears, the length of storage depends on characters inherent in the fruit itself. In the trials it is becoming important to assess the resistance of new varieties to pests and diseases. One of the main diseases which the apple grower has to control is apple scab, which often means spraying every ten days during the growing period. New apples resistant to that disease are being bred, and in a few years this might be combined with resistance to apple mildew, a disease increasingly prevalent over the past 10–15 years.

## Role of N.F.T.

Although the National Fruit Trials are now concerned primarily with testing breeders' initial selections and feeding back information on possible faults which can be corrected in future breeding, the N.F.T. also provide the breeder with a unique bank of genes. This consists of thousands of varieties built up over the years and now forming an integral part of the breeding programmes carried out at East Malling Research Station and elsewhere. The collection, which includes over 2,000 different apple varieties, probably possesses every desirable gene, and the primary function of the breeder is to assess the varieties which carry the genes he requires so that they can be introduced into his breeding programme.

An example of the way this assessment is done was when areas of the apple collection were left unsprayed and a survey made of the varieties' resistance to pests and diseases. Among several factors discovered it was found that the variety McIntosh and some of its offspring were resistant to Rosy Apple Aphid (*Anuraphis roseus*), while an old American apple King David proved to be nothing like as susceptible to Red Spider Mite (*Oligonichus ulmi*) as most other varieties. In breeding, the more obvious characters must also be taken into account, such as fruit size and quality, regularity of cropping, season, etc., and appropriate parents chosen. For this purpose breeders now make extensive use of the records available from the National Fruit Trials.

## Standards of comparison

The method of testing is relatively simple. All new material is compared with standard commercial varieties, e.g., new late dessert apples are compared with Cox's Orange Pippin, a yardstick for regularity of cropping, crop weight, growth habit, resistance to pests and diseases, and other characteristics. In pears, Conference is the main control variety. Most controls have remained much the same since the trials started nearly fifty years ago, exceptions being the strawberry and the raspberry, for which scientific breeding has been carried out over a longer period. The original yardsticks for strawberries were Royal Sovereign and Huxley, and for raspberries Red Cross and Lloyd George. These have long since been replaced respectively by Cambridge Favourite and Redgauntlet and Malling Promise and Malling Jewel, all of which far outyield their predecessors. This shows how the general standard of these crops has improved, due to the efforts of plant breeders such as R. D. Reid, D. Boyes and N. H. Grubb.

## Trials today

The following is a summary of the trials position on various fruits.

*Apples.* At present there are eight trials at different stages of progress, consisting largely of breeders' selections. Though at an early stage of development some already show promise.

Early bearing is another desirable character, shown in some newer seedlings which started cropping in their second year; many older varieties took 5–6 years before producing a crop.

A new apple arousing interest is the Canadian variety Summerred. This is a mid-season variety of the McIntosh type with a bright red colour. It has cropped particularly well in its early years.

A seedling from East Malling, as yet unnamed (Cox's Orange Pippin × Jonathan), promises to be a good late keeping apple, much better in eating quality than Idared, the main truly late storing apple currently available. A number of still newer selections have an equally good keeping quality and still better flavour than this seedling, thus proving that the tradition for good flavour in English apples is not being lost by modern breeding.

*Pears.* The pear breeding programme in this country is still in its infancy, and the industry will have to depend upon Conference, and to a lesser extent Doyenné du Comice, for some years to come.

*Cherries.* The future of the sweet cherry is probably the most promising of all the tree fruits, despite a declining acreage over the last 10–15 years. One main problem has been its susceptibility to Bacterial Canker (*Pseudomonas morsprunorum*), a disease which can quickly take a rapid toll of trees. As it takes 15–20 years for a cherry tree to come into full bearing, any loss can be very serious. However, breeding for resistance to this disease has been undertaken at the John Innes Institute, and many of the large number of selections which passed their screening tests are now on trial at Brogdale to determine field resistance and cropping potential. These have not been sprayed, and it is interesting to note that, although the trials are still young, some of the controls such as Merton Bigarreau and Napoleon are already showing infection while many of the seedlings are not. There is every hope, therefore, that the problem of Bacterial Canker will be overcome before long.

Combined with this resistance, many of the seedlings have fruit characters as good, if not better, than existing commercial cherries, while some come into bearing at quite an early age. Furthermore, some are self-compatible in pollination, making it possible to plant them in a block (all existing sweet cherries are self-incompatible and many cross-incompatible, so that careful arrangement of the trees at planting is necessary to ensure proper cross-pollination).

Another problem with the sweet cherry has been the lack of a dwarf rootstock. Although rootstocks have been raised which appear to be dwarfing in the nursery, when grafted or budded, it was the scion variety that had the overriding effect on vigour and the trees grew as strong as any other. However, at the John Innes Institute seedling rootstocks known as genetic dwarfs have been raised which produce a relatively small tree when grafted or budded with the sweet cherry. It remains to be seen if dwarfing will be maintained

and if these rootstocks will be satisfactory in cropping, freedom from Bacterial Canker, etc. A trial of these genetic dwarfs is now in its third year at Brogdale, and it is hoped that the results may resolve the age-old problem of obtaining cherry trees which can be picked without needing long ladders (see Figs. 1 and 2).

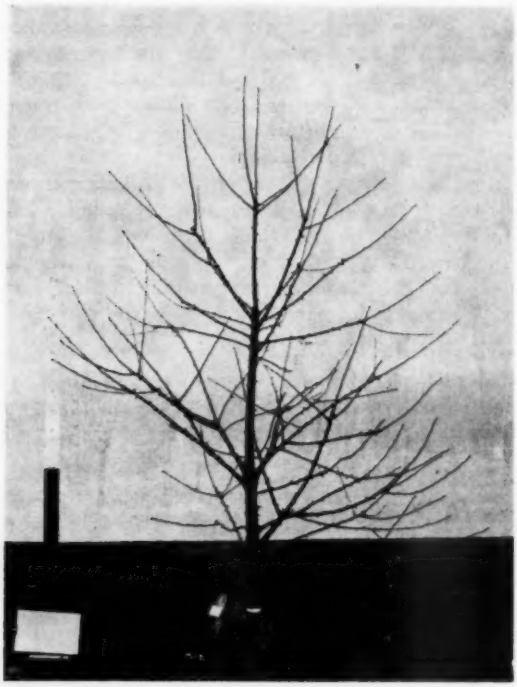

*Fig. 1. Three year old cherry (Merton Glory) on the normal rootstock used for sweet cherries, Mazzard F12/1*

*Plums.* Any expansion of acreage of this fruit is doubtful; it flowers early in the season, rendering the blossoms liable to damage by late spring frosts or bringing about lack of cross-pollination because of cold weather. This makes cropping rather erratic; generally speaking the crop can either be light, not meeting the demand, or a glut, causing the market to be over supplied. Until regularity of cropping is possible there can be no rational marketing. A breeding programme has been started at Long Ashton Research Station and it is hoped that it may be possible to introduce late flowering, and so bring about more regular cropping. Meanwhile other new plums are on trial at Brogdale, mostly raised overseas.

*Strawberries and Raspberries.* Our breeders have already achieved a considerable improvement in strawberry variety, and from present day varieties yields of 5 tons per acre or over are quite common compared with 30 cwt twenty years ago. Breeding is continuing at three of our research stations, and better strawberries will doubtless be introduced in due course, although

improvement may be only marginal over existing varieties.

New strawberries, and this applies largely to raspberries as well, should bear large, firm fruit, of good quality for the fresh fruit market and for processing without colour additive. They should be adaptable to mechanical harvesting and resistant to the more prevalent diseases such as Verticillium Wilt (*Verticillium spp.*) in strawberries and Spur Blight (*Didymella applanata*) in raspberries.

Strawberry trials are now continuous at the National Fruit Trials, and even before one is complete another may be planted. This gives some indication of the number of new seedlings being tested.

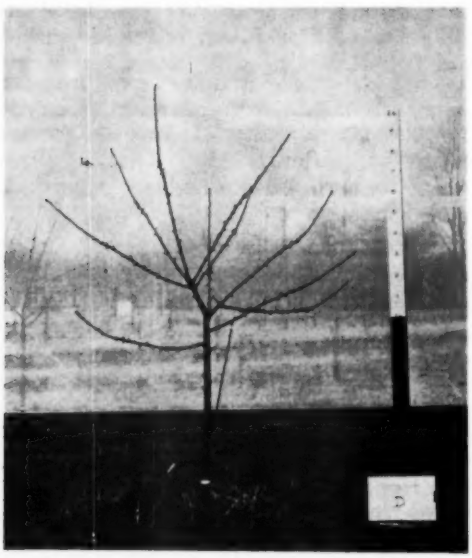

*Fig. 2. Three year old cherry (Merton Glory) dwarf tree produced by using a genetic dwarf seedling as rootstock. This type of tree is much smaller than that shown in Fig. 1, making picking simpler and cheaper, and will permit closer planting thus giving heavier crops per acre in the earlier years*

Trials of raspberries, which are now also continuous, consist of seedlings raised at East Malling Research Station and the Scottish Horticultural Research Institute. In a trial recently completed the performance of three seedlings justified them being named and released. These are Glen Clova from Mylnefield, and Malling Admiral and Malling Orion from East Malling. There is little doubt that within the next decade considerable improvement in variety will be found.

*Black Currants.* The cropping of this fruit has, to some extent, been like the plum, erratic due to its early flowering habit. However, new hybrids have been produced and one on trial now flowers as late as the apple, sets well and produces berries of reasonable size. There is little doubt, therefore, that this is the first of a new race of black currants which should ensure regular cropping, thus making rational marketing possible.

## Fruit for processing

One of the most important outlets for soft fruits is for processing and preserving. The National Fruit Trials maintain close connections with the British Food Manufacturing Industries Research Association at Leatherhead and the Food Preservation Research Association at Chipping Campden. Samples of the more promising varieties are supplied to these associations to test suitability for jam, quick freezing and canning. The market for quick frozen fruit is certain to increase, and this requires a firm berry which will not degenerate too much when thawed. There is likely to be an increase in the use of fruit in pies and ready-prepared food products, while it is always required for jams and fruit juices. The cost of harvesting fruit for these processes is becoming an important factor and the suitability of cultivars for mechanical harvesting is constantly being examined.

The responsibility of the National Fruit Trials is ever increasing as a link between breeder and grower and to advise breeders on planning their future programmes.

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**J. M. S. Potter, O.B.E., V.M.H., N.D.H.,** is the Director of the National Fruit Trials at Brogdale Farm, Faversham, Kent.

### Jubilee of National Fruit Trials

This year the National Fruit Trials celebrates its fiftieth year. To mark the event an Open Day will be held at Brogdale Farm on Thursday 11th May commencing at 2 p.m., to which fruit growers and anyone interested in the trials is invited.

This will include a conducted tour of the most interesting items in the trials and there will also be exhibits in the packhouse to illustrate results from the trials.

Further details may be obtained from The Director, National Fruit Trials, Brogdale Farm, Faversham, Kent.

# Condensation in Farm Buildings

**J. N. Addison,** *Lands Arm, A.D.A.S., Leeds*

CONDENSATION problems are prevalent in many buildings. The intensity of the problem varies according to the factors involved and in this respect farm buildings are no exception. Wet roofs, walls streaming with water and damp floors, which are common sights in many stock buildings, dairies and crop stores, provide the evidence. Condensation can damage woodwork through setting up moulds and rots which ultimately cause the timber to deteriorate. Metal fittings can quickly become corroded, which is potentially dangerous where electrical and water fittings are concerned. Wall renderings when continuously wet can be subject to attack and once the surface is destroyed the rest of the rendering quickly deteriorates leaving the wall vulnerable to damage.

## Dairy premises

Some farm buildings are more seriously affected than others and this is particularly true in the case of dairy buildings. The demand for high standards of hygiene in milk premises and the desire to control the incidence and spread of disease requires that the internal wall, floor and roof surfaces are constructed with smooth and impervious materials. This, together with increased stocking rates and ventilation problems, creates conditions which contribute to the causes of condensation, the presence of which in stock buildings can be a warning sign that conditions are likely to affect the health of the animals. Additional problems arise in dairies where ceilings are generally low and flat and large quantities of hot and cold water are used.

There can also be serious difficulties with crop stores due to the demand to store crops over longer periods of the year.

## Old buildings

In the past farm buildings had thick unrendered walls with open or porous joints, and the spacious roof, with its open tiling or stone slabs, allowed the free movement of air. These thick walls provided some insulation and the rough surface prevented the formation of droplets, so with the management systems then prevalent condensation was not a serious problem. In addition, the very mass of the structure stored heat and this helped to reduce temperature fluctuations.

## Cause and prevention

Why does condensation occur and how can it be reduced? Cattle produce body heat and a great deal of moisture. The heat warms the air which then takes up moisture. As this air rises and comes in contact with a colder surface its temperature is lowered and the moisture is released again, running down

internal roof and wall surfaces, dripping where it is checked, for example at junctions and purlins. This moisture soaks the bedding in stock buildings and wets the straw covering crops in storage buildings, creating undesirable conditions. The aim is to prevent temperature fluctuations and to provide a movement of air within the building. This can be achieved by the use of insulation and ventilation.

## Insulation

The degree of insulation against heat movement varies with different materials and forms of construction. Most insulating materials rely on the air contained within them for their insulation properties. Cavity walling, which is used extensively for domestic housing, is an example of where the insulation is provided by a continuous air cavity within the wall construction. Other materials used to increase the insulation of a building structure and usually supported by the walls or roof are glass fibre, insulation boards, mineral wall polystyrene, polyurethane and wood wool slabs. It is imperative that all insulating materials are kept continuously in a dry state for once they become damp the insulation value rapidly falls off. Water vapour can penetrate into the insulating material unless the material itself is sealed against vapour movement or a vapour proof barrier is provided. The walls and roof of the building structure must be completely waterproof, particularly the walls to which insulation boards or slabs are attached. Structural frames must be insulated where they project inside a building.

## Ventilation

Natural ventilation can provide sufficient movement of air within a building to prevent condensation. Open ridges, hoppers, ventilation stacks, vertical space boarding and Yorkshire boarded roofs are well tried systems. There are other methods of providing natural ventilation which are effective if used in the correct situation. Successful natural ventilation depends upon a number of different factors such as siting, elevation, degree of exposure, proximity of other buildings and trees and local climatic conditions. In certain circumstances it can be necessary to assist the natural system by mechanical means.

Condensation can be overcome but every building has different problems. It should be remembered that insulation and ventilation are dependent on one another for satisfactory results. Expert advice on a particular problem could well save a great deal of money and trouble.

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The next few issues of *Agriculture* will include articles on such subjects as meat rabbit production, swedes in the seventies, the Farm Buildings Association 1971 tour of France, the International Society for Horticultural Science, apple and pear storage in Kent, the Pea Growing Research Organisation, reducing the calf rearing chore, etc.

*Side effect of using herbicides to reduce soil cultivation; untreated raspberry growth in alleys caused by undisturbed soil, permitting root spread. Growth must be removed to allow access and to prevent competition with row canes for water and nutrients*

# Herbicide Management

**H. M. Lawson**

VARIOUS aspects of soil and weather conditions, weed biology and spray application may be classed as integral parts of good herbicide practice. However, in this article the emphasis is on the wider subject of integrating herbicide usage into farm management. Herbicides have done three main things for farmers:

(*a*) reduced costs of weed control;
(*b*) allowed changes in crop management; and
(*c*) allowed changes in crop rotation.

What they have not done is reduce the need for efficient farm management.

Unfortunately many farmers and growers adopt herbicide treatments into their crop management systems without reappraising the system to see what further modifications are needed to maintain what may be termed 'good husbandry'. The result is clearly seen in the presence of so many weedy crops up and down the country, despite the availability nowadays of herbicides for almost every agricultural and horticultural situation. Faulty spraying techniques, adverse weather or soil conditions, and bad timing account for a proportion of these weedy fields, and the solution is often fairly obvious. In

many cases, however, weedy crops and continually increasing costs of herbicide treatment can be attributed also to flaws in the overall management strategy.

## Weed control in the crop rotation

There is a very bad habit amongst scientists, advisers, contractors and growers of treating each crop as a self-contained unit rather than as part of a rotation. Weed control operations in each crop are considered to apply only to that crop and must preferably be paid for by that crop.

Much attention has been paid in recent years to the economics of spraying cereal crops, with the emphasis on cutting costs wherever possible by using either minimal herbicide treatment or none at all as long as cereal yields or ease of harvesting are not impaired. This well-meaning advice is perfectly valid for the individual cereal crop, but it may be very short-sighted in a rotational context, particularly if fruit or vegetable crops follow the cereal crop. For instance, is it worthwhile spending extra money to control speedwells and pansies in cereals since these weeds are unlikely to have any adverse effect on the crop? The answer may well be yes if the next crop after

*Swede turnips treated with 4lb a.i./ac propachlor pre-crop emergence. The problem weed is fumitory due to build up of weed aggravated by continual use of linuron in potato crops in the rotation in spite of the resistance of this species. Trifluralin should have been chosen for the swedes*

the cereal part of the rotation is strawberries or sugar beet, in which the grower intends to use lenacil for weed control. Failure to control such weeds in cereals may prevent the use of the cheaper residual herbicides in a following fruit or vegetable crop with a consequent increase in herbicide costs or even the need to abandon a management programme. The extra expense incurred is often much greater than the few shillings outlay saved in the cereal crop. The cereal crop must now be regarded as the major cleaning crop in the rotation and weed control operations should take into account the potential weed problems of the following crops.

Potatoes may also be used as a cleaning crop for the control of perennial weeds before planting fruit or vegetables; but this role has largely been lost where the potato crop is treated with residual herbicides and given a minimum of cultivation. Before deciding the weed control programme for potatoes it is therefore worth deciding whether the objective is short-term or long-term weed control. Incidentally, inefficient lifting of a potato crop may give rise to the problem of the potato as a perennial weed in subsequent small-seeded vegetable crops, while barley shed by wind or the combine harvester is often a nuisance in crops relying on residual herbicides for weed control.

Couch grass is a particularly difficult weed to control in most fruit and vegetable crops and the proper place to tackle it is in the cereal, potato or swede turnip part of the rotation. Forward planning is needed to ensure that vulnerable crops are planted into clean fields. There is, for instance, no profit in leaving a couch-infested barley stubble untouched during the autumn months and then looking around immediately before planting strawberries in April (or worse still, shortly after planting) for a suitable herbicide. There is none available at present.

Changes in general management in other parts of the rotation can aggravate weed problems in specific crops. Continuous spring cereal growing favours the spring-germinating part of the weed flora. Is it then surprising that subsequent spring sown or planted fruit and vegetable crops have to contend with massive populations of spring germinating weeds? Rotation of the time of seedbed preparation, e.g., by growing winter wheat, would help to prevent any one group of weed species from becoming dominant.

The introduction of high-yielding but relatively non-competitive varieties of cereals, such as the short-strawed barleys, has meant that the crop gives less aid to the herbicide in controlling weeds. A higher standard of weed control is therefore required, which may involve the use of more expensive herbicides than were necessary with older varieties. Failure to achieve better weed control can aggravate the weed problems of the following part of the rotation. Couch grass also appears to build up more rapidly under these conditions. On the other hand, farmers often fail to exploit advantages of new techniques, e.g., the earlier harvest dates of the newer barleys give more time for stubble cleaning in autumn; the recent availability of couch grass herbicides for use in established raspberries can allow this crop to be considered as a cleaning crop in the rotation.

It is now possible to use the herbicide linuron on a total of thirteen arable crops including, recently, spring cereals (for corn marigold). Lenacil can be used on sixteen crops, and simazine on twenty-four crops. Imagine the fumitory problem which could build up on a farm where linuron is used in several successive crops. Alternatively, consider the mayweed problem which could develop in a rotation where cereals are sprayed with MCPA, brassicas receive trifluralin, potatoes are treated with prometryne, carrots with linuron and sugar beet with phenmedipham. Obviously there is a need to rotate herbicides round the farm as well as or in the absence of crop rotation.

In fact, what is required is a planned rotational programme of weed control aimed at protecting the more vulnerable crops from difficult weed problems and preventing the development of a weed flora which makes continuation of the crop rotation either increasingly expensive or impracticable.

## Weed control in the individual crop

Before the farmer can properly choose the appropriate herbicide for a particular crop he needs to know the composition of the weed flora. In most cereal crops this is straightforward, since he or his contractor's fieldsman can walk the field before treatment is chosen and applied. With residual herbicides the problem of choice is more difficult, since the weeds cannot be identified before treatment. The best solution is for the farmer to chart the major weed species occurring in each field every year. This obviously requires effort and time, but should repay its cost by allowing more economic and intelligent herbicide use. It also allows potential problem situations to be noted before they reach a critical level. This aspect of herbicide management is no less important to weed control than assessment of the nutrient status of the soil is to efficient fertilizer management.

*Direct drilled cabbage treated with 1lb a.i./ac trifluralin incorporated pre-drilling. The problem weed is Shepherd's purse because of the wrong choice of herbicide for weed flora*

Before choosing the herbicide for the crop it is as well for the farmer to consider what the main object of weed control is in this particular crop, e.g., to control one dominant weed species, to prevent early or late weed competition, to speed up harvesting, to avoid noxious weeds in a processing crop or to control a weed likely to be a nuisance to the next crop. Each of these objectives could mean the choice of a different herbicide.

Given the wide range of weed species and soil conditions which occur in arable fields in Britain it is unreasonable to expect any one residual herbicide treatment to control all weeds throughout the life of the crop. All these herbicides have gaps in their weed spectrum and limited persistence. If they controlled all weed species they would almost certainly kill the crop as well. If they persisted for the whole growing season, the next crop would probably

be affected by soil residues. Therefore, unless the crop is able to smother any resistant or late emerging weeds, some form of supplementary treatment is likely to be needed. The important thing is to plan the programme before starting, keep it flexible, and carry out the operations in a timely manner. The simplest form of supplementary treatment is shallow cultivation and in many crops one such operation is sufficient. Many farmers appear to think that herbicides have completely replaced cultivation and that to cultivate the soil is a retrograde step. On the contrary it is an essential tool in herbicide management and is often cheaper and more effective than any herbicide treatment. If the farmer intends to use hoeing as a supplementary treatment, his choice of residual herbicide might be influenced by the ease of hoeing of the weed species resistant to the herbicide, e.g., shepherd's purse (resistant to trifluralin) would be easier to hoe out of a cabbage crop than chickweed surviving treatment with propachlor. On the other hand, if desmetryne is

*First year raspberries treated with 2lb a.i./ac simazine shortly after planting in late March. The problem weed is knotgrass because of continuous spring cropping and poor cereal weed control practice. No other residual herbicide is available for this crop until established for at least two years*

chosen as the supplementary herbicide in a closely drilled brassica crop, this herbicide controls chickweed while shepherd's purse is resistant. The choice of residual herbicide would therefore depend on the available supplementary treatments. Programmes of weed control are particularly necessary for non-competitive crops like onion.

Flexibility is needed to allow for unexpected or adverse situations. Normally lenacil and phenmedipham complement each other's weed spectra very well in red beet or sugar beet. However, in dry springs, poor performance by the residual herbicide may allow knotgrass and mayweed to grow away. The application of the foliar herbicide in these circumstances is a waste of time and money and the farmer would do better to use either cultivation or directed application of paraquat.

The application of simazine to newly planted raspberries in some springs may give rise to pure stands of knotgrass. Early cultivation plus a further application of simazine is likely to lead to another flush of knotgrass. The directed application of paraquat, however, would kill seedling knotgrass and the lack of soil disturbance would prevent further germination. Alternatively, repeated cultivation until June would take the crop past the normal germination period of knotgrass and further simazine could usefully be applied.

Many crops are now grown in very close rows or in beds where cultivation is impracticable. This development has been made possible very largely because of the advent of herbicides. However, if the herbicide programmes available to the farmer are not sufficiently reliable to ensure adequate weed control in his situation, he would be far better to revert to a growing system which permits the use of cultivation as a rescue operation.

Nevertheless, a dense, vigorous crop can be of great assistance to herbicide treatment in achieving good weed control and farmers might well consider the possibilities of increasing the odds in favour of the crop, e.g., by sowing high quality seed at adequate seeding rates, giving ample fertilizer and protecting the crop from pests and diseases. If a crop such as peas has poor field emergence, pigeon damage, pea and bean weevil and mildew, it will be much less competitive and require a far higher standard of weed control by herbicides than a normal healthy crop.

Lastly, changes in weed control operations in a crop may lead to unexpected problems which require attention, e.g., results of minimal cultivation such as soil erosion, soil compaction, herbicide residues, unwanted raspberry sucker growth.

## Herbicide use in perspective

To sum up, the increasing availability and usage of herbicides can have two effects on farm management. They can be used merely to replace cultivation while the farmer carries on with his old management system, in which case his fields are likely to become progressively weedier and his profits lower. Alternatively, they can be integrated into a new management system based on the intelligent planning and use of herbicides in the crop and in the rotation to maintain a high standard of husbandry and prevent the build-up of troublesome weed species.

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The caption under the photograph printed on page 133 of the March issue of *Agriculture* should have read 'Conway Castle and the River Conway' *not* 'Conway Castle and the River Ogwen'. We apologise for this error.

*Ely Cathedral dominates the Cambridgeshire Fens*

# 7. Cambridgeshire and Isle of Ely

**H. J. Mason**

THE Fens of Cambridgeshire and the Isle of Ely are usually referred to as 'Black Fens' because the soils have been derived from peat. This distinguishes them from the silt fens of Lincolnshire (Holland). There is a small area of this rich soil near Wisbech, which is the centre of an intensive fruit growing area. Bramley apples are grown there to perfection and strawberries, gooseberries and nursery stock are also extensively grown.

## The 'black fens'

Under arable cultivation fen peat wastes, causing field levels to drop up to one inch per year. Since there is much less wastage in undisturbed peat below roads and buildings, they are now frequently a few feet above field levels. As hedges and trees are rare there is always an uninterrupted view of fields and crops from the elevated roads.

When crops are in full growth, fields appear to be flat; but a closer examination reveals that this is by no means the case. The degree of unevenness increases each year as more peat wastes and field levels gradually assume the

contours of the original fen floor. A feature of this process is the way in which ancient river beds, with their accumulation of silt, become exposed as banks called rodhams. The Little Ouse rodham, which can be seen from parts of the Littleport to Mildenhall road, is particularly large.

A considerable acreage of deep peat remains in the Soham and Littleport areas, and within a few miles of these towns about 80 per cent of the national acreage of celery is grown. Plants are purchased from specialist raisers and mechanically transplanted into rows 4–5 feet apart. As the season progresses the rows are gradually earthed up to increase the amount of bleaching at the base of the plant. The light peat soil has the virtue of being easily washed or shaken off and of remaining dry enough for harvesting to continue throughout the autumn and early winter.

When the fens were drained there was a considerable variation in the depth of peat. Where it was shallower, after only a few years of cultivation mineral subsoil was brought up during ploughing to form a skirt soil. Now there are extensive areas where there has been sufficient wastage for the mixture of peat and subsoil to occur during normal cultivations.

## Root crops

Often a silty clay underlies the peat and in such a situation the skirt soil which develops is much heavier and more difficult to cultivate than an organic soil. In spite of the soil texture changes which are occurring, the fens are still used almost entirely for root, vegetable and cereal growing.

*Potatoes.* On many farms potatoes are the most important crop. In recent years the acreage of traditional varieties, such as King Edward and Majestic, has fallen, while Pentland Crown and Maris Piper have become increasingly popular. Maris Piper is particularly favoured because of its resistance to race A of the potato cyst nematode, which is a major pest. Cultivation systems designed to produce clod-free tilths suitable for mechanical harvesting have been developed by growers on heavy skirt land.

As there is such a concentration of potato crops, blight can easily spread under favourable weather conditions from one field to another. Routine spraying usually starts in early July and in a bad blight year as many as seven applications are made to fields of very susceptible varieties. On the large open fenland fields aircraft or helicopters are often used, as they can so quickly spray a large acreage and there is no loss of crop through wheel damage.

*Sugar beet.* Very heavy yields of sugar beet can be obtained on these rich soils but sugar content is usually lower than in beet grown on mineral soils. The acreage 'drilled to a stand' is increasing now that herbicides which can be effectively used on organic soils are on the market. On small farms a contractor with a single row harvester is often hired for harvesting, but on the larger farms multi-row systems are becoming popular.

*Carrots.* On the light peat and skirts near Chatteris, carrots are an important crop. Grower/merchants hire suitable land for growing carrots, which they wash and pack ready for market. As soon as clay becomes mixed with the peat it is no longer used for carrots and there is a trend towards growing more of the crop away from the fens on the light sands of Norfolk and Suffolk.

Some of the peat, especially in the west, is naturally very acid. This was land where only oats, rye and potatoes were grown until the remedial value of factory lime sludge was realized. Up to 40 tons per acre has to be applied before a full range of arable crops can be grown on some fields.

On the naturally alkaline peats, and following over-liming, manganese deficiency is a serious problem. Sugar beet is very susceptible and on severely deficient soils spraying is necessary three times before deficiency symptoms disappear. Peas suffer from marsh spot in these areas if not sprayed adequately.

### Livestock

A few dairy herds are kept on the high ground, where the heavy clay soil is not so suitable for arable cropping. The Ouse washes, which provide good summer grazing, are used mainly for fattening and store cattle.

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# Ministry Publications

Since the list published in the March 1972 issue of *Agriculture* (p. 136) the following publications have been issued.

MAJOR PUBLICATIONS

DEPARTMENTAL PUBLICATION

The Restoration of Sand and Gravel Workings. *Available only from Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex, HA5 2DT.* (New) 10p (by post 12½p) *(not for re-sale)*

OUT OF SERIES

Farm Buildings Pocket Book in Metric (New) 22p (by post 24½p)
(SBN 11 241008 1)

MECHANIZATION LEAFLET

Barn Hay Drying (Revised) 8½p (by post 11p)
(SBN 11 240723 4)

FREE ISSUES

ADVISORY LEAFLETS

AL. 46. Weed Control: Docks (Revised)
AL. 51. Weed Control: Thistles (Revised)
AL. 91. Beet Leaf Miner (Revised)

SHORT TERM LEAFLETS

STL. 19. Choosing Selective Weed Killers for Use On Cereals in The Spring (Revised)

STL. 29. Choosing Selective Weed Killers for Annual Weeds in Root Crops and Kale (Revised)

*Priced publications, unless otherwise stated, are obtainable from Government Bookshops (Addresses on p. 188) or through any bookseller. Single copies of free items are obtainable from the Ministry of Agriculture, Fisheries and Food (Publications), Tolcarne Drive, Pinner, Middlesex HA5 2DT.*

# in brief

- **Forestry's two-fold function**
- **The potato in The Netherlands**
- **What size of dairy herd?**

**Forestry's two-fold function**

THE outstanding virtue of the Forestry Commission is that whilst it is pre-eminently concerned with the business of growing, planting and managing trees to supply a voracious home market for timber, it provides as a natural concomitant a nation-wide amenity. This year's Annual Report* supplies additional evidence of this fact, for public ownership through the Commission of three million acres of land means that a far greater area of this land is open to public access than would be the case had it remained under other ownership. Commercial forestry and the recreational development of forests are seen to be proceeding in a particularly amenable association, opening most of them to the walker and nature-lover, 121 to orienteering, 120 to car rallying, 98 to fishing and 58 to pony trekking. The establishment last year of a Conservation and Recreation Branch at the Commission's headquarters is yet a further indication of the importance being given to the policy and planning of recreation and landscape amenity and the conservation and control of wildlife in woodland areas.

The criticism, not infrequently heard, that hardwood trees are being lost to conifers was met by Lord Taylor of Gryfe, Chairman of the Forestry Commission, when he presented this Annual Report. He said: 'Since its inception in 1919 the Forestry Commission has built up and maintained a large hardwood estate (three-quarters of it consists of beech and oak) which now extends to about 125,000 acres, most of it in the southern half of England. Hardwoods have also been used extensively to improve the amenity of the Commission's plantations not only by planting, but by retaining single trees, clumps of trees and larger areas during felling operations. More recently the Commissioners have, however, recognized that greater emphasis should be given to maintaining the woodland character of the countryside, particularly in the south of England. They have recognized that to this end in certain of their woodlands the maintenance of hardwoods, where silviculturally possible, is an essential part of the landscape. The form of management necessary may entail the lengthening of the life span of the hardwood crop, the more gradual replacement of that crop with hardwoods sometimes inter-mixed with conifers to provide a nurse for the hardwoods, or the retention of some scrub areas. The objective of the Commissioners is to perpetuate by active management the living character of the woodland landscape for future generations to enjoy.'

The country's expenditure of £175 million on the import of timber products in 1970 (much greater, it is said, than the combined income raised by the export of cars and whisky) indicates the size of the problem in which home-grown timber has partly to find a solution; and by the end of the century the import bill is expected to be twice as high! By that time our timber production will have increased three-fold and be capable of providing some 15–20 per cent of our total needs—and the industrial demand for home-grown timber and wood is overwhelmingly for that from coniferous trees.

*Forestry Commission 51st Annual Report and Accounts, 1970–71. H.M. Stationery Office, 75p (80p by post).

**The potato in The Netherlands**

POTATOES are so important in Dutch arable farming, say Netherlands official sources, that the continued existence of many arable farms largely depends upon them. Of The Netherlands 1·7 million acres of arable land, today almost 23 per cent is devoted to the crop, in comparison with only 13 per cent ten years ago; and 40 per cent of the total expenditure on arable cultivation goes into it. This is one side of the coin; on the other, by modern methods and the increasing size of holdings, the number of growers has fallen by half in the period 1960–70. Of the total production, 68 per cent is now being grown on something over 10,000 farms, each averaging about 25 acres of potatoes. Domestic consumption is running at a level of over 3 lb per head per week, which is slightly more than our own average. Of this total 15 per cent is in the form of crisps, chips and other manufactured products.

In recent years the trading organization has been developing by leaps and bounds, with sorting, packing and, in some instances, storage being done almost entirely by private and co-operative business instead of by individual farmers. But the potatoes are sold as close as possible to their market— directly to allied industry, chain stores and wholesalers in The Netherlands and abroad. Traders have now begun to come in on the growing side, so that already there are a number of farms which have thus been 'vertically integrated'. As a result, a number of potato farms have acquired an individual character as regards mechanization, added value and financial turnover.

The annual export of potatoes from The Netherlands is currently valued at an equivalent of around £62 million (more than three times the figure for 1960), comprising ware and seed sent to between seventy and eighty countries and those for industrial use and processing, much of which goes to West Germany. It is also claimed that The Netherlands is not only the largest exporting country of potato starch and derivatives, but also of ware potatoes and seed, while in 1970 she also became the largest exporting country of chips, crisps, purée and other consumer products.

**What size of dairy herd?**

FROM time to time the precepts and examples of mammoth size dairy herds here and abroad, running under superlative management and automated to the last push button, capture the headlines in the farming press, leaving the average farmer bewildered by the astronomical figures of gallonages, throughputs, capital outlay and feeding tonnages. In such stories lie the demonstrable advantages of scale, but whilst the trend to intensivism must, by reason of basic economics, continue to escalate, it has nevertheless its upper limits for any one farmer in any one given situation.

Decision on size of herd is essentially an individual matter, and governed by a number of factors, not all of which, notably cost of labour and feedingstuffs at the one end and the overall farm gate price at the other, are within the farmer's control. In terms of maximum profitability there is, of course, an optimum size of dairy herd for every farmer in milk, and in this context too large a herd can be as uneconomic as one too small. Rising investment and production costs are a constant threat to any farmer working on the margins of his profit-and-loss account.

It seems, therefore, that intensification in milk production should proceed 'softly, softly' if the vulnerability that comes with over-extension of capital commitment is to be avoided; and what is true of milk can also be said of beef. Foreseeably, most of our milk will continue to come from family farms running herds of 60–120 cows—that is, of a more general manageable size and where good cowmanship can operate in the most responsive conditions.

*AGRIC*

# Books

**Agricultural History Review. Vol. 19. Part II.** Edited by JOAN THIRSK. British Agricultural History Society, 1971. *£1·50.*

It is not easy to measure the debt we owe to the British Agricultural History Society, which over the past nineteen years has done so much to repair the long neglect of British agricultural history. The spirit of inquiry which first stimulated the formation of this body and has since continued to inform it is well reflected in its bi-annual *Review* which has placed on record the findings of much research in the archives of an evolutionary rural society.

The current issue is particularly notable for the contribution of P.F. Brandon, who writes on the Demesne Arable Farming in Coastal Sussex during the Later Middle Ages. Little has been written about the origins of the tremendous contribution made to medieval agriculture by the vast manorial estates of feudal lord, church and monastery, so that the author's researches in this field are especially welcome. In the early fourteenth century, with the exception of parts of Kent, no other part of the kingdom equalled the prosperity enjoyed by the Sussex coastal plain, geographically favoured by its physical attributes and its ease of access to home and continental markets. Based primarily on a closely integrated sheep-and-corn farming structure in which husbandry skill, the innovation of legume-growing (mainly vetch) and less adherence to the orthodox three-course system were marked to an outstanding degree, and paid labour was becoming the rule rather than the exception, many of these arable demesnes were farmed both intensively and flexibly, with wheat as the leading crop. Already the advances that were to be seen in the agrarian economy of sixteenth and seventeenth century coastal Sussex were being foreshadowed.

Also in the same issue D. J. Rowe's article on the Culley brothers, Matthew and George, recalls the era of the great improvers. From their farm at Fenton, close to the Scottish border, these pupils of Bakewell were promulgating the gospel of abolishing the fallow in favour of drilled turnips on a ridge-and-furrow system for winter sheep management. Predominantly of course, it is the story of the Culley development of the famous Border Leicester sheep that Mr. Rowe has to tell, but he goes beyond this in surveying the wider fields of interest which this prosperous partnership of brothers opened up for their contemporaries and following generations.

Copies of this issue of the *Agricultural History Review* and information regarding yearly subscription to the British Agricultural History Society may be obtained from Andrew Jewell, Museum of English Rural Life, The University, Whiteknights, Reading, Berkshire.

*S.R.O'H.*

**The Mole.** KENNETH MELLANBY. Collins, 1971. £2.

This pleasantly written book fills a gap in the Collins New Naturalist series of monographs but, despite the promise on the dust cover that it contains much hitherto unpublished information, it does not so completely fill gaps in our knowledge of moles. It is short, very short in relation to its price, and easy to read following the style seen in the author's *Pesticides and Pollution*. Numerous quotations are cited from a wide variety of sources, including several historical ones, and indicate the interest that has been engendered over the centuries by the mole and the mysteries of its mode of life; we find the mole was classed as 'vermin' in an Act of Parliament of 1566.

Most aspects of mole biology and ecology are touched upon but rarely dealt with in the depth one might expect in a monograph. It is surprising to find scarcely any tabular data and only one graph, and this with the units wrong on one axis. Several of the text illustrations could be improved and others, which have been used elsewhere, lack attribution.

A chapter on 'Life in Different Habitats' deals with the mole in deciduous woodland on clay soil, coniferous forest, fenland, Breckland, farmland, uplands and gardens and emphasizes what a wide range of soil types can be exploited by moles. Another chapter likely to catch the farmer's eye is 'Ecological Importance—the Mole as a Pest'. After a survey of the types of damage moles are usually said to cause, and the dismissal of some possibly beneficial aspects of the mole's activities, the author concludes that 'the mole is a comparatively minor pest, at least on the national level', although no attempt is made to quantify damage in financial terms.

*A.R.M.B.*

**Agricultural Trade and the E.E.C.** JOHN SOUTHGATE. Fabian Society, 1971. *30p.*

This booklet of thirty-six pages can only deal with the essential features of the subject. The publishing date—May, 1971—means that it was not possible to take account of the important U.K./E.E.C. negotiations in June or of the Government's White Paper of July on 'The U.K. and the European Communities'. Even so, much of what is written makes a relevant contribution to an understanding of this complex matter. Moreover, within the confines of this short study an attempt is made to set current developments in their historical context.

Frequently writers on E.E.C. agriculture concentrate on temperate agricultural products. This is understandable since Common Market production and the Common Agricultural Policy (C.A.P.) are mostly concerned with temperate produce. However, the Community's agricultural trade includes sub-tropical and tropical produce which is of vital significance to the exporting countries, especially where these are developing countries. Many of these developing countries have 'Associated' status with the E.E.C., following agreements negotiated with the E.E.C. These Associated states, whose total populations amount to some seventy million, are in particular the former African colonial territories of France, Belgium and Italy and they enjoy tariff preferences with the Community in respect of much of their tropical produce other than sugar. John Southgate, the author, is able to write on the foregoing with expert knowledge as he has served in the Colonial Office and with the West African international secretariat: currently he is Executive Director of the Commonwealth Sugar Exporters Association.

Perhaps the most interesting section is that concerning sugar, which provides much useful information. This section must, of course, be read in conjunction with the London *Agreement* of 2nd/3rd June when the British Government and the representatives of the developing country members of the Commonwealth Sugar Agreement recorded: 'their satisfaction at the Community's readiness to offer the Governments concerned a choice of forms of association or a trading agreement'. Moreover, the British Government gave an assurance that 'the Community's proposals constituted a specific and moral commitment by the enlarged community . . .'.

Although the study is reasonably well balanced it is somewhat pessimistic and perhaps does not make sufficient allowance for the fact that the C.A.P. has been in operation for less than ten years (it did not start effectively before 1962) and has had to face many teething troubles.

*G.W.F.*

**Farming Systems in the Tropics.** HANS RUTHENBERG. Clarendon Press, 1971. *£5·50*

Doctor Ruthenberg brings to bear in this study his wide ranging experience and knowledge to analyse seven major and distinct systems of tropical farming. As such the work will be of interest to those concerned with the direction of, and those engaged in, tropical agriculture. The book will be particularly useful to graduates in temperate agriculture who intend to do service in tropical farming.

The seven systems described have been classified as follows:—

i. shifting cultivation,
ii. semi-permanent cultivation,
iii. regulated ley farming,
iv. permanent cultivation on rain-fed land,
v. arable irrigation farming,
vi. perennial crop cultivation, and
vii. grazing systems.

These systems, either singly or one or more in association with each other, will provide the basis of almost any type of farming likely to be found in the tropics, and most of the major crops have been included in the study. The book is amply illustrated with over thirty photographs (many in colour), graphs, tables and diagrams.

Both the broad economic and the technological factors are dealt with where the various systems are analysed. The study places special emphasis on the farm management aspects but such other factors as soil fertility and labour productivity receive appropriate consideration. The study is given a practical *flavour* by the inclusion of case studies. Finally, towards the end of the chapter in each system the weaknesses and the possible lines of development are briefly examined.

A useful bibliography of apposite international literature and an index are included. The book is 'topped and tailed' as it were by an introductory and concluding chapter by J. D. MacArthur, who deals respectively with the general characteristics of farming in a tropical environment and some general tendencies in the development of tropical farming systems.

*G.W.F.*

# Agricultural Chemicals Approval Scheme

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**TCA**

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**Change of address:-**

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ACKNOWLEDGMENT OF PHOTOGRAPHS

We gratefully acknowledge permission to use the following photographs: Cover, Eagle Photos. Pp. 160, 161 and 162, G. Sinclair. Pp. 175, 176, 178 and 179, Scottish Horticultural Research Institute. P. 181, H. J. Mason.

*AGRICULTURE*

7½p net monthly

Postal subscription rate, Home and Overseas: £1·20 per annum

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